

## SECTION I—CLAIMS

### Amendment to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application. Claims 30, 33-35, and 38-44 are amended herein. Claims 1-29 remain canceled herein without prejudice. No new claims are added.

### Listing of Claims:

1-29. (Canceled)

30. (Currently amended) A method comprising:

receiving content for transmission from a wireless communication system having *M* transmit

antennae and *N* receive antennae and *Nc* subcarriers, where *Nc>>M,N*, the received  
content for transmission from a plurality of more than two of the *M* transmit antennae,  
wherein the received content is a vector of input symbols (*s*) of size *Nc* x 1, and wherein  
the *Nc* subcarriers is the number of subcarriers of a the multicarrier wireless  
communication channel of the wireless communication system; and

generating a rate-one, space-frequency code matrix from the received content for transmission  
via the plurality of more than two of the *M* transmit antennae by dividing the vector of  
input symbols into a number *G* of groups to generate subgroups and multiplying at least a  
subset of the subgroups by a constellation rotation precoder to produce a number *G* of  
pre-coded vectors (*v<sub>g</sub>*), wherein successive symbols from the same group transmitted  
from the same antenna are at a frequency distance that is multiples of *MG* subcarrier  
spacings, wherein *M* represents a number of transmit antennae.

31. (Previously Presented) A method according to claim 30, further comprising:  
dividing each of the pre-coded vectors into a number of  $LM \times 1$  subvectors; and  
creating an  $M \times M$  diagonal matrix  $D_{s_g,k} = \text{diag}\{\Theta_{M \times (k-1)+}^T s_g, \dots, \Theta_{M \times L}^T s_g\}$ , where  $k=1\dots L$  from  
the subvectors.

32. (Previously Presented) A method according to claim 31, further comprising:  
interleaving the  $L$  submatrices from the  $G$  groups to generate an  $M \times Nc$  space-frequency matrix.

33. (Currently amended) A method according to claim 32, wherein the space-frequency matrix  
provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the  
transmit antennae  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .

34. (Currently amended) A method according to claim 30, wherein the space-frequency matrix  
provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the  
transmit antennae  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .

35. (Currently amended) An apparatus comprising:  
a diversity agent;  
to receive content for transmission from a wireless communication system having  $M$   
transmit antennae and  $N$  receive antennae and  $Nc$  subcarriers, where  $Nc >> M, N$ ,  
the received content for transmission via a multicarrier wireless communication  
channel of the wireless communication system, wherein the received content is a  
vector of input symbols ( $s$ ) of size  $Nc \times 1$ , and wherein the  $Nc$  subcarriers is the  
number of subcarriers of the multicarrier wireless communication channel;  $[[ , ]]$   
and  
to generate a rate-one, space-frequency code matrix from the received content for  
transmission on the multicarrier wireless communication channel from a plurality

of more than two of the  $M$  transmit antennae by dividing the vector of input symbols into a number  $G$  of groups to generate subgroups and multiplying at least a subset of the subgroups by a constellation rotation precoder to produce a number  $G$  of pre-coded vectors ( $\mathbf{v}_g$ ), wherein successive symbols from the same group transmitted from the same antenna are at a frequency distance that is multiples of  $MG$  subcarrier spacings,  
, wherein  $M$  represents a number of transmit antennae.

36. (Previously Presented) An apparatus according to claim 35, the diversity agent further comprising:

a space-frequency encoding element, responsive to the pre-coder element, to divide each of the pre-coded vectors into a number of  $LM \times 1$  subvectors, and to create an  $M \times M$  diagonal matrix  $D_{s_g,k} = diag\{\Theta_{M \times (k-1)+1}^T \mathbf{s}_g, \dots, \Theta_{M \times k}^T \mathbf{s}_g\}$ , where  $k=1 \dots L$  from the subvectors.

37. (Previously Presented) An apparatus according to claim 36, wherein the space-frequency encoding element interleaves the  $L$  submatrices from the  $G$  groups to generate an  $M \times Nc$  space-frequency matrix.

38. (Currently amended) An apparatus according to claim 37, wherein the space-frequency matrix provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the transmit antennae  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .

39. (Currently amended) An apparatus according to claim 35, wherein the space-frequency matrix provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the transmit antennae  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .

40. (Currently amended) A wireless communication system comprising:  
a number  $M$  of omnidirectional antennas, wherein  $M$  comprises more than two omnidirectional

antennas;

a number  $N$  of receive antennae;

a number  $N_c$  of subcarriers of a multicarrier wireless communication channel of the wireless

communication system, where  $N_c \gg M, N$ ; and

a diversity agent; [ , ]

to receive content for transmission via [[a]] the multicarrier wireless communication

channel, wherein the received content is a vector of input symbols ( $\mathbf{s}$ ) of size  $N_c \times$

1, and

, wherein  $N_c$  is the number of subcarriers of the multicarrier wireless communication

channel, and

to generate a rate-one, space-frequency code matrix from the received content for

transmission on the multicarrier wireless communication channel from at least a

subset of the  $M$  omnidirectional antennas by dividing the vector of input symbols

into a number  $G$  of groups to generate subgroups and multiplying at least a subset

of the subgroups by a constellation rotation precoder to produce a number  $G$  of

pre-coded vectors ( $\mathbf{v}_g$ ), wherein successive symbols from the same group

transmitted from the same antenna are at a frequency distance that is multiples of

$MG$  subcarrier spacings.

41. (Currently amended) A wireless communication system according to claim 40, the diversity agent further comprising:

a space-frequency encoding element, responsive to the pre-coder element, to divide each of the pre-coded vectors into a number of  $LM \times 1$  subvectors, and to create an  $M \times M$  diagonal matrix  $D_{\mathbf{s}_g, k} = diag\{\Theta_{M \times (k-1)+1}^T \mathbf{s}_g, \dots, \Theta_{M \times k}^T \mathbf{s}_g\}$ , where  $k=1 \dots L$  from the subvectors.

42. (Currently amended) A wireless communication system according to claim 41, wherein the space-frequency encoding element interleaves the  $L$  submatrices from the  $G$  groups to generate an  $M \times Nc$  space-frequency matrix.

43. (Currently amended) A wireless communication system according to claim 42, wherein the space-frequency matrix provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the omnidirectional antennas  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .

44. (Currently amended) A wireless communication system according to claim 40, wherein the space-frequency matrix provides  $MNL$  channel diversity, while preserving a code rate of 1 for any number of the omnidirectional antennas  $M$ , receive antennae antenna(s)  $N$  and channel tap(s)  $L$ .